

Application No. 10/065,446
Docket No. DP-307128
Amendment dated June 21, 2004
Reply to Office Action of March 19, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (currently amended): An optical sensor package comprising:

a chip carrier;

a device chip electrically and mechanically connected to a first surface of the chip carrier with solder connections, the device chip having an optical sensing element on a surface thereof;

a capping chip secured to the chip carrier with a solder joint to hermetically enclose the device chip, the solder joint having a lower melting temperature than the solder connections, the capping chip having means for enabling radiation to pass through the capping chip to the device chip;

conductive vias electrically connected to the solder connections of the device chip, the conductive vias extending through the chip carrier from the first surface thereof to a second surface thereof; and

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bond pads on the second surface of the chip carrier and electrically connected to the conductive vias.

Claim 2 (original): The optical sensor package according to claim 1, wherein the chip carrier is formed of a low-temperature co-fired ceramic material.

Claim 3 (original): The optical sensor package according to claim 1, wherein the device chip is received in a recess formed in the chip carrier.

Claim 4 (currently amended): An optical sensor package comprising: ~~The optical sensor package according to claim 1,~~

a chip carrier;

a device chip electrically and mechanically connected to a first surface of the chip carrier with solder connections, the device chip having an optical sensing element on a surface thereof;

a capping chip secured to the chip carrier to hermetically enclose the device chip, the capping chip having means for enabling radiation to pass through the capping chip to the device chip, wherein the means for enabling radiation to pass through the

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capping chip comprises a monocrystallographic silicon portion of the capping chip;

conductive vias electrically connected to the solder connections of the device
chip, the conductive vias extending through the chip carrier from the first surface
thereof to a second surface thereof; and

bond pads on the second surface of the chip carrier and electrically connected
to the conductive vias.

Claim 5 (original): The optical sensor package according to claim 4,
wherein the means for enabling radiation to pass through the capping chip further
comprises an antireflection coating on a surface of the capping chip and overlying the
monocrystallographic silicon portion thereof, the antireflection coating minimizing
reflection of a range of radiation wavelengths by the capping chip.

Claim 6 (original): The optical sensor package according to claim 4,
wherein the means for enabling radiation to pass through the capping chip further
comprises a coating on a surface of the capping chip, the coating being substantially
opaque to a range of radiation wavelengths and having an opening aligned with the
monocrystallographic silicon portion of the capping chip and the optical sensing element

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on the device chip.

Claim 7 (currently amended): The optical sensor package according to claim 1, further comprising a substrate having conductors on a surface thereof, and second solder connections securing the package to the substrate and electrically and mechanically connecting the bond pads on the second surface of the chip carrier to the conductors on the substrate.

Claim 8 (original): The optical sensor package according to claim 1, wherein the chip carrier is one of a plurality of chip carriers defined by a chip carrier wafer, the capping chip is one of a plurality of capping chips defined by a capping chip wafer, and the device chip is one of a plurality of device chips enclosed between the chip carrier wafer and the capping chip wafer.

Claim 9 (original): An infrared sensor package comprising:
a chip carrier formed of a low-temperature co-fired ceramic material, the chip carrier having a first surface, an oppositely-disposed second surface, conductive vias extending through the chip carrier between the first and second surfaces thereof,

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and bond pads on the second surface and electrically connected to the conductive vias;

a device chip flip-chip mounted to the first surface of the chip carrier with first solder connections electrically connected to the conductive vias of the chip carrier, the device chip having an infrared sensing element on a surface thereof; and

a capping chip secured with a solder ring to the chip carrier to hermetically enclose the device chip within a cavity defined between the chip carrier and the capping chip, the capping chip being formed of monocrystallographic silicon so as to enable infrared radiation to pass through a wall portion of the capping chip to the infrared sensing element on the device chip, the solder ring having a lower melting temperature than the first solder connections.

Claim 10 (original): The infrared sensor package according to claim 9, further comprising an antireflection coating on a surface of the capping chip and overlying the wall portion thereof, the antireflection coating minimizing reflection of infrared radiation by the capping chip.

Claim 11 (original): The infrared sensor package according to claim 9, further comprising a coating on a surface of the capping chip, the coating being

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substantially opaque to infrared radiation and having an opening aligned with the wall portion of the capping chip and the infrared sensing element on the device chip.

Claim 12 (original): The infrared sensor package according to claim 9, further comprising a substrate having conductors on a surface thereof, and second solder connections securing the package to the substrate and electrically and mechanically connecting the bond pads on the second surface of the chip carrier to the conductors on the substrate, the second solder connections having a lower melting temperature than the first solder connections and the solder ring.

Claim 13 (original): The infrared sensor package according to claim 9, wherein the chip carrier is one of a plurality of chip carriers defined by a chip carrier wafer formed of the low-temperature co-fired ceramic material, the capping chip is one of a plurality of capping chips defined by a capping chip wafer formed of monocrystallographic silicon, and the device chip is one of a plurality of device chips enclosed between the chip carrier wafer and the capping chip wafer.